FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.
Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Nov. 16	Lecture, "The Co-relation of Model and Full-scale Work," by R. McKinnon Wood, before R.Ae.S.
Nov. 17	Lecture, "Oleo Undercarriage Design," by G. H. Dowty, before I. of Ae.E.
Nov. 30	Closing date for FLIGHT Glider Designing Competition
Dec. 1	Lecture, "Constructional Design of Aeroplanes," by C. W. Tinson, before I.Ae.E.
Dec. 15–Jan. 2	Paris Aero Exhibition

1923.

June	International Air Congress, London
Dec. 1	Entries close for French Aero Engine Competition

1924.

Mar. 1	French Aero Engine Competition
Mar. 15	Entries close for Dutch Height Indicator Competition

EDITORIAL COMMENT.

AS far as can be gathered, the report on the bombing operations by the Royal Air Force on the northern frontier of Iraq is highly satisfactory. Sir John Salmond's policy of restoring the original frontiers in the Mosul and Kirkuk districts by intense bombardment appears to have resulted in the retirement of the Turks, as the villagers refused to assist in maintaining the frontiers, and altogether it is now considered that aircraft have proved themselves capable of suppressing raiding parties in countries of this nature. Thus it would appear that already the taking over by the R.A.F. of the policing of Iraq is promising extremely well, and it is, perhaps, permissible to hope that the policy may be extended to other areas. It has probably never been seriously disputed that, if the R.A.F. can do this work at all, it can do it more efficiently and cheaply than can any other service. It is too early, perhaps, to claim that the Royal Air Force has definitely proved all that it can do, but at any rate a very good start has been made, and, personally, we have not the slightest doubt that as time goes on the R.A.F. will justify those who decided to place the maintenance of peace and order in their charge. But, as we have previously pointed out, the authorities at home must do their share, and see to it that the R.A.F. in Iraq is supplied with the best and most up-to-date material available. Otherwise we may see a repetition of the Indian scandal, caused by cheese-paring methods begotten of a mistaken idea of "economy."

The R.A.F. in Iraq

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Aviation in Russia

The definite report that Russia is building a huge fleet of 5,000 aeroplanes, ostensibly Russian, but in reality designed, built and operated by Germans, must cause misgivings among all thinking people. Accepting the report at its face value, the possession by any nation of such a fleet may easily constitute a serious menace, and when, as in this instance, the nation concerned is one which is at present not in association at the councils of other nations, the menace becomes even greater. Even

allowing for a good margin of exaggeration, and cutting down the 5,000 aeroplanes to 500, the situation is one which must assuredly bear watching carefully. Germany's handicap within her borders makes it hardly to be wondered at that she has, as was always predicted by us, evolved other means of development. The real menace lies in the fact that there does not appear to be any way of preventing this sort of thing.

It is, of course, quite possible that Germany has engineered this scheme simply to be used as a lever against the Allies, in the hope of being able, by promising to build no more machines in Russia, to secure her release from the irksome restrictions now imposed. When the scheme, now in the making, was negotiated there was no knowing when the restrictions would be removed, and we should not be surprised if some such motive was behind the Russian affair.

Now the restrictions are likely to be modified, but apparently Germany is still to be allowed to go on with her schemes abroad. Perhaps "allowed" is scarcely the correct word, as there does not appear to be any way of preventing it, but one remedy at any rate remains, that of being prepared ourselves. The hundreds of aircraft which were to be ordered, according to Lloyd George's glowing promises, do not seem to have materialised; at any rate, we have not noticed that any of our aircraft constructors or engine firms are being swamped with orders. The new types that are being developed do not go into production in any quantities worth mentioning, and no firm yet was able to exist on a few experimental machines per year. The subject is one which the new Air Minister would do well to study very carefully, and which we recommend for his immediate attention. The British aircraft industry has existed mainly on promises much longer than it could reasonably be expected to do. It cannot continue for ever on promises. In fact, there *are* signs of a debacle which it would be well to neutralise before too late.

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"L'Escadrille Roland Garros"

The formation, in France, of a propaganda squadron, comprising some of the most famous aviators in the world, sets an example which might well be followed at home. The new squadron, *L'Escadrille Roland Garros*, is being officially recognised by the French Under-Secretary of State for Air, M. Laurent Eynac, and, furthermore, it is to receive a Government subsidy. The extent and manner of allocating this subsidy is not yet known, but we gather that it is the intention of M. Eynac to use the squadron for propaganda purposes, by sending it to various centres to give demonstrations, by letting it take part in all important aviation events, and by making extensive public use of it generally.

There is little doubt that such a squadron will do an immense amount towards keeping alive public interest in flying, and if a similar squadron were formed in this country, recruiting for the R.A.F. Territorial Force would doubtless benefit greatly thereby. Furthermore, such a squadron could be used for "showing the flag" abroad. At the forthcoming aircraft exhibition in Sweden it is, we believe, intended to invite aviators of foreign air services to participate, and the sending of a squadron of picked aviators could not fail to do much to maintain British prestige abroad. The cost should not necessarily be prohibitive, and even regarded from a purely commercial point of view should be well worth while.

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Is the "Moto-Aviette" Coming?

The recent success of the gliding competition at Itford may be assumed to have established on a sound footing gliding as a sport and as a possible method of full-scale research at insignificant cost. The week spent on the South Downs taught most of us a great deal, and, not least of all, how much there still is that we do not know. At the same time, it must be clear that gliding, as a means of locomotion, can have no very great future before it. To our way of thinking, gliding may be compared with sailing and yachting. A man may—and a very great number do—get an immense amount of pleasure out of sailing his boat or yacht week ends and holidays. But he does not use his boat for getting about in the ordinary course of business, where a reasonable time-table has to be kept. So with gliding. As a sport, it will, we are sure, become extremely popular, providing as it does an exhilarating pastime at trifling cost. While this is all to the good, we should not lose sight of the fact that experience with gliders may pave the way for the low-power aeroplane of the near future.

It is perfectly well known that a small single-seater can be built which will fly horizontally with a power expenditure of about 5 h.p. Another 5 h.p. in reserve should provide sufficient margin for getting-off and climbing, and thus we arrive at a rough estimate of a small single-seater using but 10 or 12 h.p., and doing about 50 miles per gallon of petrol. Such a machine should be produced for £150 to £200, or little more than a motor-cycle and side-car outfit. The mileage would be about the same, and the machine should have a maximum speed of at least 45 m.p.h., with a landing speed of certainly below 30 m.p.h. Such a machine could be landed almost anywhere, and should appeal to hundreds. Personally we confess we are inclined to think that the tandem arrangement, as exemplified in the Peyret glider, lends itself more readily to making a "fool-proof" machine than does the ordinary form of aeroplane. Most small aeroplanes are somewhat tricky to handle, whereas it would appear that the tandem monoplane can be made very stable, and yet be manœuvrable to a high degree. The view obtained is unsurpassed; especially is this so in connection with small light engines, which in the normal type necessitate shifting the pilot forward, over, under, or between the wings, unless, of course, the machine is a "pusher."

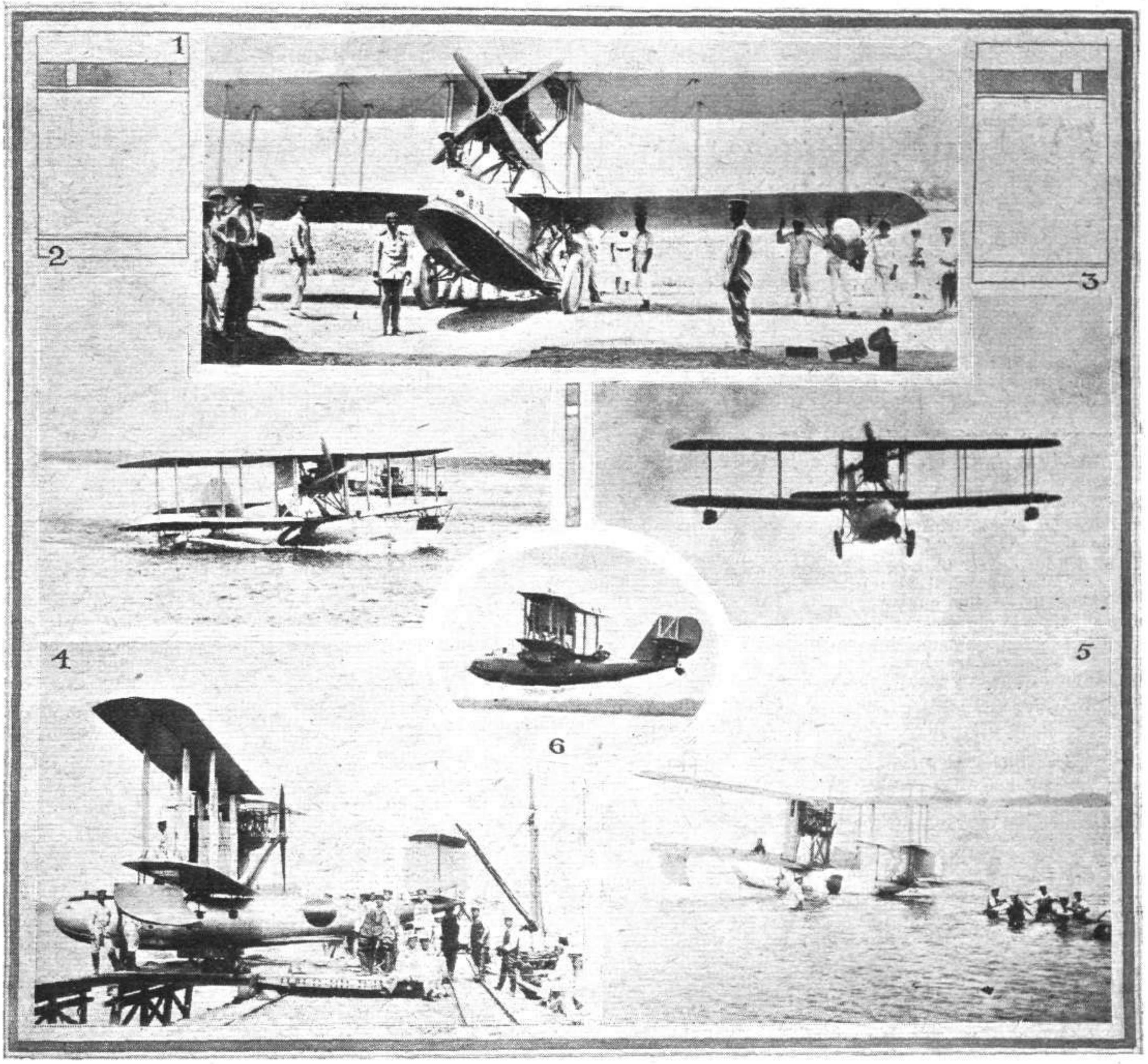
As regards efficiency, we know that the tandem monoplane arrangement is not very efficient, but experiments carried out several years ago by Eiffel indicated that there is little to choose between the ordinary non-staggered biplane and the tandem monoplane. If, therefore, the tandem arrangement does, as we expect, prove the more "fool-proof," the price paid in the way of rather low efficiency should not be too high to be worth while.

For the power plant we are in favour of a two-cylinder two-stroke air-cooled engine, placed with its crankshaft vertical, and driving the tractor airscrew through bevel reduction gearing. The cylinder heads would point forward and, being in line with the most effective portion of the propeller blades, would receive a maximum of cooling.

SUPERMARINES ABROAD

FROM the time the Supermarine Aviation Works of Southampton first commenced operations (in 1912, we believe) their history has been one of steady progress. That this has been less rapid than many could have wished is in no way the fault of the firm, but is due to the very scant encouragement which this country has always given to marine type of aircraft. Nevertheless, the firm has stuck to its guns, and today it ranks among the foremost seaplane works of the world. One cannot help admiring the determination with which Mr. Scott-Paine and Commander Bird have carried on in the face of the greatest difficulties, and lately the firm learn that all have come up to the expectations which one naturally associates with the products of this firm.

The "Channel type" naval training boat is fitted with a 240 h.p. Siddeley "Puma" engine, and as it is intended for school work it is, of course, fitted with dual controls. The type has done a great deal of useful work at home, and by way of indicating its efficiency it may be mentioned that an earlier model was fitted with an engine of 160 h.p. only (a fairly heavy one at that) and yet carried three passengers comfortably. With the higher-powered and lighter "Puma" the performance is naturally considerably better, and the hull has been proved over and over again to be exceptionally strong and seaworthy.

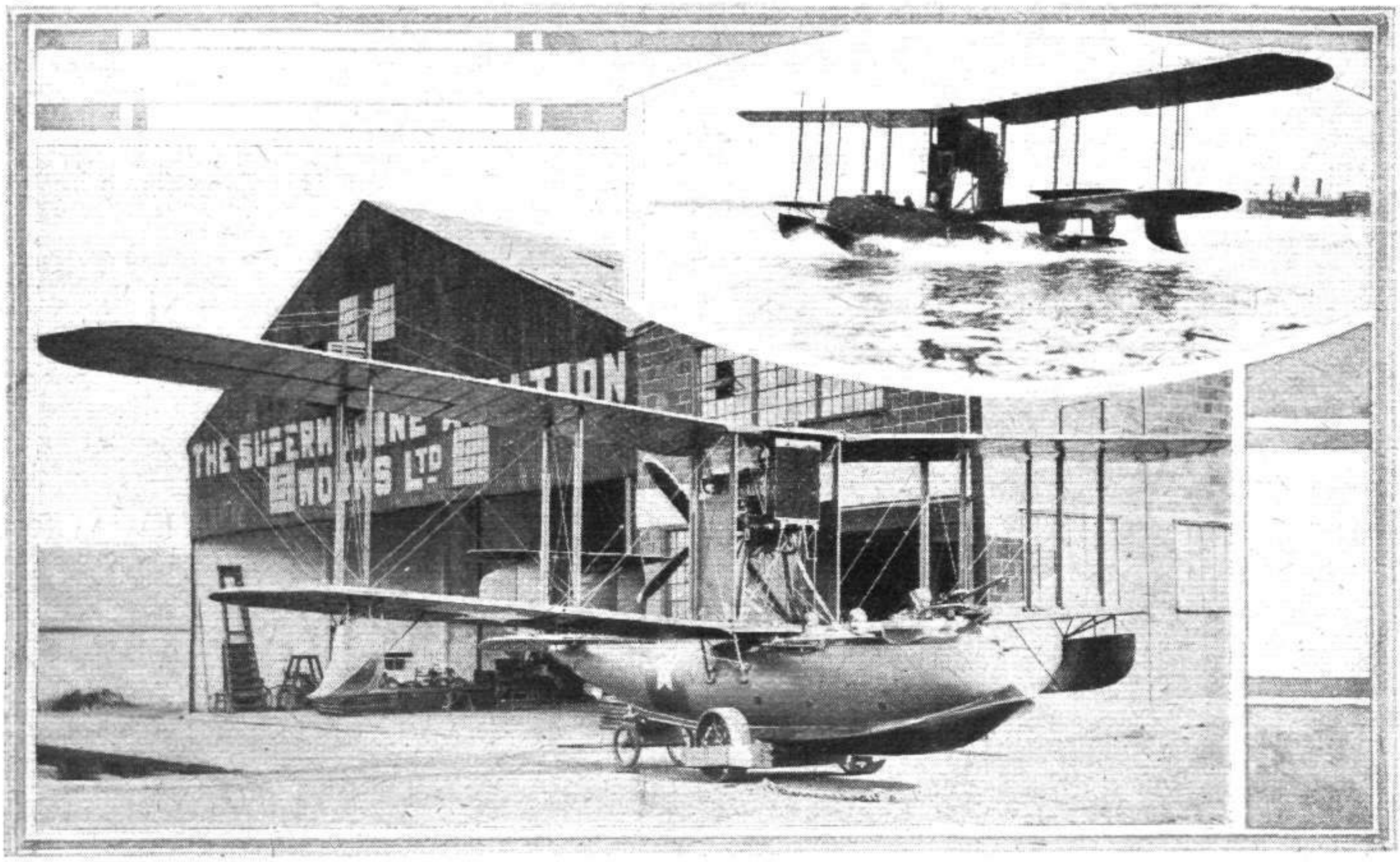


SUPERMARINES IN JAPAN: 1. A "Seagull" amphibian flying boat with Napier "Lion" engine. 2. The "Seagull" taxying. 3. The "Seagull" flying over land. Note the lowered undercarriage. 4. A "Channel type" training machine with Siddeley "Puma" on the slipway. 5. The machine on the water. 6. The "Seagull" in flight. Note the gunner's cockpit aft of the planes.

has begun to reap, if but in somewhat small measure, the reward of its foresight. If those at home have failed to recognise the possibilities of seaplanes, many foreign Governments have shown more imagination, with the result that orders have been received from, and executed for, a number of countries.

Among these is Japan, who, being an island nation, has not been slow in recognising how great is the potential value of the seaplane. We have been fortunate enough to secure the following photographs of various types of Supermarines in use by the Japanese Government, and it is gratifying to

A latter model, the "Channel type, Mark II," also fitted with Siddeley "Puma," has had its front step re-designed, with the result that she is now very much "cleaner" on the water, as will be seen from one of our photographs showing this machine taxying. It may here be mentioned that the Mark II has been sold to the Chilian Government, and is now doing good work there. The machine is fitted with dual controls, the latest and most up-to-date wireless telegraphy and telephony sets, bomb-dropping gear for practice with



SUPERMARINES IN CHILE: A "Channel type, Mark II," with Siddeley "Puma" engine. Inset, the machine taxying. Note the "cleanness" of the machine after having its front step re-designed.

dummy bombs, and a machine gun mounted in the nose, so that it is possible to give instruction in gunnery also.

The Supermarine "Seagull" amphibian flying boat is fitted with a 450 h.p. Napier "Lion" engine, and consequently has a much better performance than the school machine. From the photographs it will be noticed that this machine is a tractor type, and that as a result of the absence of an airscrew behind the wings it has been possible to place a gunner's cockpit aft of the wings. As a gun can also be placed in the nose of the hull, the "Seagull" should be well capable of looking after herself for purposes of defence, while the amphibian gear gives the advantage that the machine can alight on and get off from either land or water. Although the weight of the land gear is considerable, the added possibilities which its use confers make it well worth while fitting.

While it is gratifying to know that foreign orders are enabling the Supermarine Aviation Works to carry on, we should naturally prefer to see them fully occupied on home orders, and we trust that in due course the home market will be such as to avoid the necessity of sending such fine machines abroad.

American Non-Stop Flight

SOME time ago, it will be remembered, the American aviators Lieuts. MacReady and Oakley Kelley established what is at present claimed to be the world's duration record by remaining up for 35 hrs. 18 mins. When starting on that flight the two aviators had intended to fly across America from the Pacific to the Atlantic. Owing to unfavourable weather, however, they had to abandon the project, and flew instead over a closed circuit for the length of time stated. On November 3 the same two pilots, in the same machine (a Fokker F.IV, Liberty engine), started from San Diego on a second attempt, but this also failed, owing to a leaky water-jacket, it is stated. The machine landed near Indianapolis, having covered a distance of over 2,000 miles. This performance is claimed as a record for long-distance, non-stop flying.

German Flight over Alps

FROM Berlin it is reported that a German aeroplane (Junkers monoplane), with pilot, mechanic and four passengers, has flown across two of the highest peaks of the Tyrolese and Venetian Alps, the Gross Glockner and the Gross Venediger. The former rises to a height of 12,400 ft. and the latter to 12,000 ft. The machine was probably equipped with one of the 185 h.p. B.M.W. high-compression engines, which keep their power up to considerable altitudes.

Aeroplanes Policing Iraq

THE Basra correspondent of *The Times*, on November 1, reported that the bombing operations of the R.A.F. on the northern frontier of Iraq had had satisfactory results. An intense bombardment was carried out in pursuance of Sir John Salmond's policy of restoring the original frontiers in the Mosul and Kirkuk districts, and it is considered that the operations have proved the aeroplane's capability of suppressing raiding and propaganda parties, provided the air base is protected. The importance of this in relation to the future internal defence of Iraq, India and Egypt is obvious.

Aviation in Brazil

MR. J. T. COLE (late R.A.F.) writes us from "Caixa 1013," Rio de Janeiro, Brazil:—

"Here, in Brazil, aviation is showing a go-ahead tendency, and should prove a good market for British machines. Although the French Aviation Mission to the Brazilian Government has sold French machines, I understand that an English company has also been successful in disposing of a number of machines.

"A 'joy-ride' service has been instituted by Mr. Orton Hoover, of Sao Paulo (which has proved quite successful), with six flying boats, two of which fly regularly with two passengers at Rs. 75,000 per flip each.

"A French aviatrix has also commenced a 'cross bay' service with a Caudron, and is now building a large hangar at Nichteroy for her Rio-Nichteroy service, a distance of about 6½ miles.

"Should any readers of FLIGHT be interested in either the sale of machines or anticipate commencing a service from Rio-Santos or Rio-Sao Paulo, I shall be pleased to give them my assistance and all the available information at my disposal, or to act as agent to any aircraft company wishing to establish in Brazil."

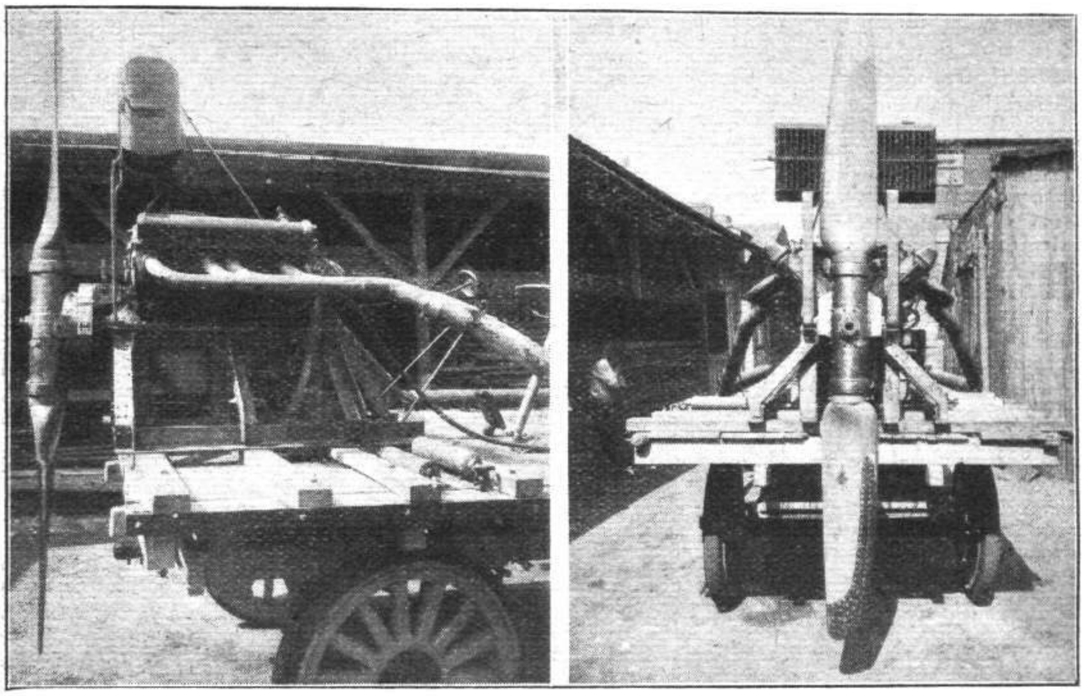
Two Spanish Records

Two Spanish flying records were established recently. Lieut. Spencer, flying a Hispano-Spad, reached an altitude of 8,100 metres (26,400 ft.), and Lieut. Gallara set up a new distance record for Spain by covering the route Guadalajara–Madrid–Tetouan–Larache, a distance of 900 km. (560 miles), non-stop.

THE PARAGON ADJUSTABLE AND REVERSIBLE AIRSCREW

MANY attempts have been made by aeronautical inventors to produce a variable-pitch and reversible airscrew. The practical value of such a device cannot be denied, especially when the pitch of the blades can be varied during flight. If this were possible, by adjusting the pitch to a less than normal angle, the engine would be able to pick up speed and deliver its maximum power, and take off with a heavier load than the same machine could otherwise normally carry. Again, upon reaching the desired altitude, by increasing the pitch the necessary amount the engine could be run at its most economical speed for that altitude, still with the possibility of increased speed range should occasion demand. On a long-distance flight, also, the pitch could be increased as the load is lessened by the consumption of fuel. It would, in other words, be the equivalent to a change-speed gear-box on a motor-car. Used in conjunction with the super-charged engine, altitudes far higher than at present obtain could be maintained.

An airscrew for which it is claimed the above achievements may be attained, has been produced by Spencer Heath, founder of one of the first airscrew making firms in America (the American Propeller and Mfg. Co.), now known as Paragon Engineers, Inc., of Baltimore, Md. It comprises a system of special blades, and a mechanism for varying the pitch of same from zero to 360°—whilst in flight or otherwise—so the pitch is not only variable for forward flight, but the airscrew is reversible as well.

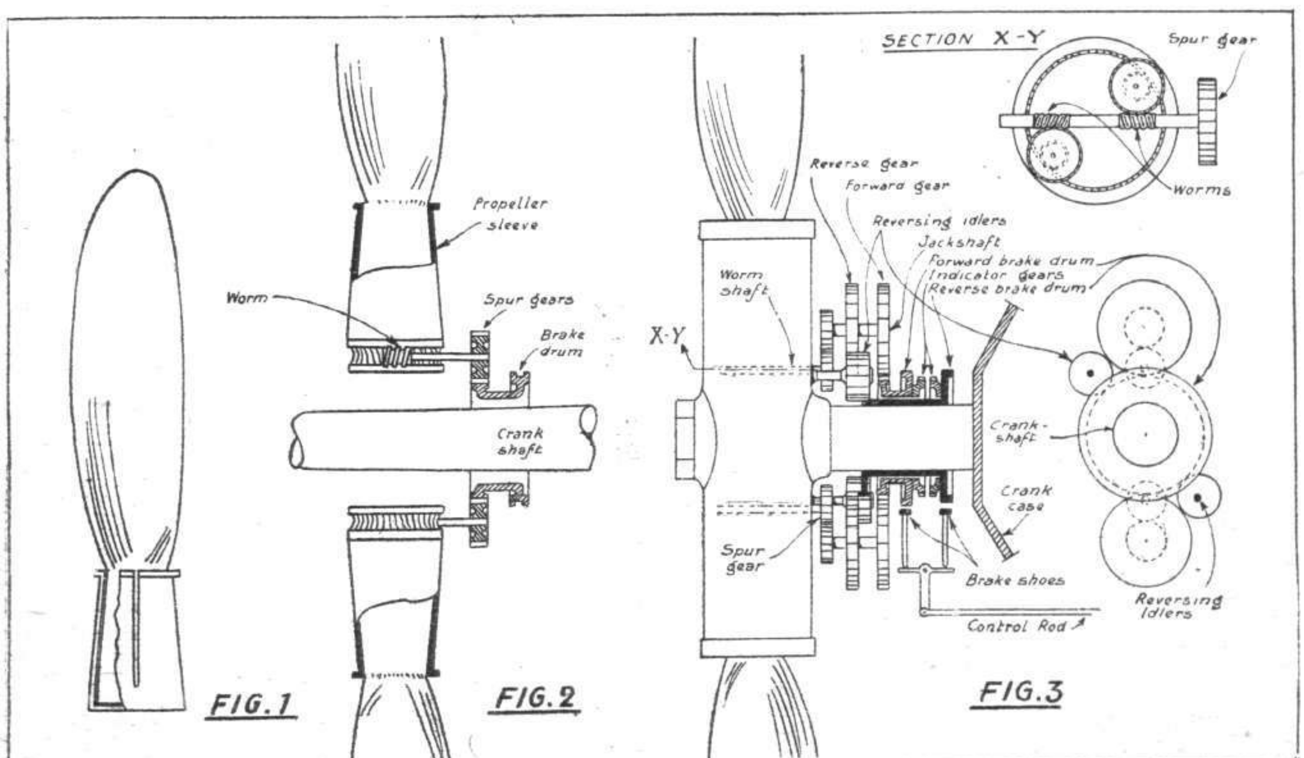


The Paragon Adjustable and Reversible Airscrew. This is seen here, fitted to a 150 h.p. Hispano engine, mounted on a trailer-truck, which it propelled forward and backward during a demonstration. The blades are shown in the neutral position.

Thus in landing, the pitch of the screw may be changed to any degree in the opposite direction, or "reversed" in about 3 seconds, just before the instant of contact with the ground and the plane brought to rest in the very shortest space.

This is a feature of considerable value in naval aeronautics, where the shortest run after landing is a prime necessity owing to the confined space which may be available on a ship's deck or even on that of an aeroplane carrier ship.

For the airship the same advantages of economy are



THE PARAGON ADJUSTABLE AND REVERSIBLE AIRSCREW: Fig. 1. Split steel sleeve holding blade. Fig. 2. The principle of operation shown diagrammatically, and, Fig. 3, in greater detail.

apparent, while the reversible attribute exactly doubles manœuvrability in docking, whether shed or mooring mast is employed.

The following advantages are claimed for the Heath, or "Paragon" airscrew :—

(*a*) Elimination of continuously running gears, collars or bearings in the pitch control mechanism.

(*b*) The use in flight of engine power in place of manual labour in changing the blade angle.

(*c*) The absence of any structural limitation to the range of blade angles available as well as the limiting of the blade travel between any two predetermined extreme positions.

(*d*) Continuous indication on the instrument-board of the blade position.

(*e*) Automatic throttling of the engine while the propeller is passing through the position of neutral pitch.

An official demonstration of the "Paragon" airscrew was given early in October at the Army flying field at Washington. The airscrew was fitted to a 150 h.p. Hispano engine, mounted on a motor-car truck trailer, which was propelled forward, backward and about the field, by means of the airscrew, at the will of the operator. Unfortunately, we have no further details of the results of this demonstration, nor any figures relating to thrust, weights, etc. Two of our illustrations, showing the airscrew thus mounted on the truck, give an idea of its general appearance, whilst the accompanying diagrams, together with the following brief description, should enable our readers to follow the principle on which the "Paragon" functions.

The two wooden or steel blades are fastened into steel sleeves which in turn are held in a steel hub, the centrifugal forces being taken on ball thrusts and torsional and axial forces on plain bearings.

The method of fixing the wooden blades into the steel sleeves is noteworthy. The butt end of each blade is tapered outwardly at a small angle as shown in Fig. 1, and the surrounding collar is split so that it may be first sprung over the butt and then compressed upon the taper.

The pitch changing mechanism is operated through the application of a braking force to either one of a pair of small brake drums surrounding the engine crankshaft and normally rotating with it. The elementary principle is shown by diagram in Fig. 2, which represents a brake drum connected through a gear train to the individual blades of the propeller. It is apparent that if the drum is allowed to revolve at crankshaft speed, all the gears will be stationary relative to the propeller, and that the pitch angle will remain constant. If, on the contrary, the brake drum is held stationary, the gear train will be set into action, and the pitch angle of the blade will undergo a continuous change until the brake drum is released.

In order to change the blade angle in the reverse direction a second brake drum is used, connecting to the worm shaft through an idler which serves to reverse the direction of rotation of the worm shaft.

It should be noted that during normal flying none of these gears are operative, and that the blades are locked in position by the non-reversible features of the worm and the friction of the connected parts.

The actual construction of the pitch-changing mechanism is more fully indicated in Fig. 3. The brakes are applied through leather-faced shoes operated from the pilot's seat by a light push-and-pull knob attaching to a brake lever mounted on the drum housing. A small hand crank is provided by which the pitch can be changed when the engine is not running.

The angular setting of the propeller blades at any instant is a function of the relative motion which has taken place between the two brake drums. The pitch indicating mechanism is, therefore, operated by gearing from the two brake drums, which conveys differential motion to the pointer of the indicator. This gearing also actuates the throttling and pitch limiting cams. As long as the two brake drums revolve both at crankshaft speed, the indicating hand remains stationary, but if either of them is retarded, an angular motion is shown on the indicator equal to that experienced by the blades themselves.

In the pitch limiting mechanism the control knob normally connects to the brake levers direct, a push increasing and a pull decreasing the pitch. If the control button is held in either operating position until the limiting position of the propeller blade is reached, the cam trips a latch plate and renders the control inoperative in that direction while leaving it ready for use in reversing the direction of propeller blade motion.

The mechanical throttle is provided with springs in both directions, so that the pilot can at any time, by applying a force on the throttle greater than the initial tension in the springs, substitute manual for automatic control.

With the engine turning at 1,500 r.p.m., the angular change from full speed ahead to full speed astern is accomplished in about 3⅓ seconds.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 29 AND NOVEMBER 4, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying: Mails	No. of flights carrying: Goods	No. of journeys completed†	Average flying time (h. m.)	Fastest time made by	Type and (in brackets) Number of each type flying
Croydon–Paris	14	58	4	12	11	2 25	H.P.W.8B G-EBBH (2h. 3m.)	D.H. 9 (1), B. (3), G. (6), H.P.W.8B (3).
Paris–Croydon	12	55	3	12	8	3 54	H-P.W8B G-EBBI (3h. 10m.)	B. (3), G. (6), H.P.W.8B (3).
Croydon–Brussels–Cologne	5	16	3	1	5	4 12	D.H. 34 G-EBBR (4h. 3m.)	D.H. 34 (3).
Cologne–**Brussels–Croydon**	4	18	3	—	4‡	—	—	D.H. 34 (3).
Croydon–Rotterdam ...	6	4	4	6	6	2 49	Fokker H-NABM (2h. 6m.)	F. (4).
Rotterdam–Croydon ...	6	10	6	6	6	2 44	Fokker H-NABQ (2h. 24m.)	F. (4).
Manchester–Croydon–Amsterdam	8	46	1	—	7§	—	—	D.H. 9 (1), D.H. 34 (3).
Amsterdam–Croydon–Manchester	8	7	2	—	5‖	—	—	D.H. 34 (3).
Total for week ...	63	214	26	37	52			

* Not including "private" flights.
† Including certain journeys when stops were made *en route*.
‡ 2 Colgn.–Brus., 1 Colgn.–Lympne.
§ Man.–Croy. 5; Man.–A'dam. 1; Croy.–A'dam. 2.
‖ A'dam.–Man. 1; A'dam.–Croy. 2; Croy.–Man. 5.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart **Maatschappij; Messageries Aériennes.**

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

THE time limit for FLIGHT glider-designing competition (for a prize of £25, and a consolation prize of £10) is, we would remind readers, November 30. The competition is open to all, and a competitor may send more than one design. Stress calculations and aerodynamic estimates must accompany the designs.

* * *

ALTHOUGH fairly full drawings are required, it is not necessary to send in a working drawing of every detail of the design, so long as the general construction is fairly clearly indicated. The inclusion of very complete drawings will, however, count in the judging of the designs.

* * *

CHEAPNESS of production should be aimed at, but in so doing competitors should bear in mind that this cheapness may be of two distinct forms. One design might lend itself admirably to quantity production by an aircraft firm, and this would certainly be a recommendation. On the other hand, another design might be practically useless for production in large quantities, but might lend itself particularly to construction by amateurs, owing to the materials chosen being cheap and the form of construction one which would entail but little skill and necessitate a minimum of tools. For amateur construction the "wages" item of the cost could be more or less disregarded, and the other features of the construction would be of major importance. Both types of design would stand an equal chance.

* * *

FULL particulars of the conditions governing the competition were published in our issue of August 31, 1922, to which we would refer readers requiring further particulars of the competition.

* * *

THE announcement that Mr. Gordon Selfridge has offered a prize of 1,000 guineas for the first flight of 50 miles to be made by a British pilot on a British-built glider, will be received with the greatest satisfaction. The prize, the regulations for which are now being drawn up by the Royal Aero Club, will remain open for one year, and in the event of it not being won, Selfridges will give 500 guineas to the pilot who has covered the longest distance (over 25 miles) during the year. The distance to be flown will be measured in a straight line from the point of departure.

* * *

IT has not yet been decided whether all flights for this prize are to start from one official starting point, or whether competitors may choose their own point of departure. In order to facilitate the work of the official observers it would appear to be an advantage to confine the starts to one particular point, but, on the other hand, this arrangement might seriously restrict competitors as regards the number of days in the year suitable for making a start. No one hill can be suitable for all wind directions and velocities, and it is conceivable that days otherwise favourable for an attempt might be lost through the particular point of starting being confined to one hill.

* * *

PERSONALLY we are inclined to think that the district should be definitely decided upon (*i.e.*, either the South Downs or the North Downs), but that competitors should be allowed to choose their starting point anywhere, due notice being, of course, given to the Royal Aero Club officials. It might happen that in this way we should discover some particularly favourable spot whose existence would otherwise have remained unsuspected.

* * *

As regards the possibility of winning the prize, the distance stipulated is certainly a long one. Fifty miles without an engine will not be easily accomplished, but we should not like to say that it cannot be done. Before the *Daily Mail* competition there were very many who doubted that anyone would succeed in attaining the minimum duration of 30 mins. Yet this figure was exceeded on the very first day of the competition. On the second day Raynham remained up for very nearly four times the stipulated minimum, while Maneyrol reached a duration of close on seven times the minimum.

THUS it may be expected that, although at the moment 50 miles may sound a lot, by the time pilots have had some experience in flying along ridges the distance may sound less unattainable. A good glider should have a gliding angle of about 1 in 18 or 1 in 20. In a good strong following wind this figure might be increased to 1 in 30, or even more. Thus a pilot might succeed in flying along a ridge for some 30 or 40 miles, finishing up over a fairly high hill, from which the country slopes down gently for several miles. In a strong wind he might be expected to be able to reach a height of 1,000 ft. above sea level, and if gliding down wind, at a gliding angle of 1 in 30, he would be able to reach a point 30,000 ft. from where he started his glide. Should there be smaller hills *en route* from which he could gain a certain amount of lift, his distance would be increased.

* * *

THAT is one way in which the problem may be attacked, and is probably the one that will be chosen. The simplest way would, of course, be flying along a ridge of the required length, but it may be doubtful if such a ridge exists, at any rate, in sufficiently unbroken form to make that possible. On the other hand, conditions might allow of gliding from the end of one ridge until the up-currents from the next were picked up. At any rate, the mere trying should teach us quite a lot about air currents around hills, quite apart from the, as yet untouched, problem of real "gust-flying," in which sudden changes in velocity of the wind itself are made use of. About the latter practically nothing is known, even the Germans admitting that, with all their experience, they have not yet done other than soar in winds with an upward trend. It is, of course, the gust-flying which is really fascinating, and which, if we can succeed in discovering the secret, will open up quite new possibilities.

* * *

INCIDENTALLY, it is of interest to speculate upon the possibility of the new competition showing that the machines which failed to do much in the *Daily Mail* competition may be the best for the distance competition. The Peyret glider scored heavily, owing to its controllability. It may be doubted whether, regarded purely as a glider, it is as efficient as some of the orthodox designs. It appears probable that in the distance competition fine gliding angle, low rate of descent and the capacity to fly and remain up in relatively light winds will be of more use than they proved in "sitting" on the top of a jet of air, and that, on the other hand, very great manœuvrability may not be so imperative.

* * *

IN this connection it should be remembered that we have not yet seen how the machines would have behaved over the southern slopes of the ridge from Itford to Firle beacon. It is at any rate conceivable that here machines with low flying speed might do better than on the northern slopes, where, it will be remembered, the wind actually proved too strong on certain occasions, machines being blown backwards over the top of the hill. Some of them might feel quite at home in a fairly moderate south or south-west wind over the more gentle southern slopes. In this respect gliding and soaring seem to form a very good modern parallel to boat sailing, some boats being at their best in a strong wind, others in a gentle breeze. And, incidentally, this is all to the good of the sport, as it will tend towards a greater variety of types.

* * *

M. LOUIS PEYRET did us the honour of calling at our office the other day, having just finished crating his machine at Selfridges preparatory to taking it back to France. We naturally took the opportunity to have a chat with him about his now famous glider, from which certain items may not be without interest to readers of this journal.

* * *

WE had some doubts as to the effectiveness of the rudder on the Peyret, and learned that, as originally designed, it had a smaller rudder. During a few short flights in calm air at Combegrasse the original rudder proved rather insufficient, and the addition seen at Itford was made. During Maneyrol's flight it was discovered that, contrary to expectations, the machine could be steered quite well with the rudder only, the *ailerons* being held central. During the first quarter of an hour or so of his great flight, Maneyrol used the *ailerons*, but after that he did nearly all his controlling with the rudder, finding that the machine automatically took its correct bank in response to the rudder movement. The flaps were used occasionally for elevating, but M. Maneyrol found that the machine was quite stable laterally

a good balance having, evidently, been struck between c.g. position, dihedral and side area.

* * *

IT is of interest to note that last year M. Peyret won first prize in a competition for model gliders, his model being practically an exact scale model of the present Peyret-Maneyrol glider. It would thus appear that quite a good deal may be learned about gliders from experiments with models.

* * *

ASKED whether he had thought of putting a small engine in his glider, M. Peyret answered that quite likely he will do so later on. A preliminary estimate indicates that the machine will fly level on approximately 5 b.h.p., so that if an engine of about 10 b.h.p. were fitted there should be ample reserve for getting off. Such a machine should be extremely economical to run, as it would probably do about 50 miles to the gallon of petrol.

* * *

IT would also appear that the tandem monoplane, although somewhat inefficient, might be more easily made "foolproof" than the more orthodox types. Usually the very small machine is sensitive on its controls, and is somewhat tricky to handle. It seems likely that the tandem type might possess certain advantages in this respect, and if that should prove to be so, the slight loss in efficiency which attends the tandem arrangement would not be a high price to pay for a machine which even the novice could soon learn to handle with confidence. At any rate, the subject is one worthy of consideration.

* * *

WHILE on the subject of the Peyret-Maneyrol glider, we wish to point out two errors in our issue of October 26. In the full-page scale drawings on p. 622 the scale in the lower right-hand corner is wrong. The dimensions on the drawings, and the drawings themselves, are correct, but by mistake the scale of feet put on the sheet afterwards was too small. The second error occurs in the control diagram on p. 623. Here the control cables to the rear wing flaps should cross, *i.e.*, the cables from the port levers in the cockpit should cross over laterally to the cranks of the starboard rear flaps, and *vice versa*. As shown, the action would be correct for elevator control, but when used as *ailerons* the flaps on the rear wing would move in the wrong direction.

* * *

MR. J. F. LEEMING, of 38, Albert Road, Hale, Cheshire, would like to get in touch with anyone in the Altrincham district interested in gliding, with the object of forming a gliding club and carrying out experimental work. Mr. Leeming has already built four gliders, and is at present at work on a fifth, a monoplane of 36 ft. span.

* * *

As a result of several enquiries from readers, we publish below a table giving the position of the centre of pressure (expressed as percentage of chord) for various angles of incidence of the Göttingen No. 441 wing section. It will be seen that the c.p. is unusually far back, the most forward position reached (at 16° incidence) being 37 per cent. of the chord, from the leading edge. At −3° the c.p. is 61 per cent. of the chord from the leading edge.

A. of I.	C.P.	A. of I.	C.P.
−3	61	8	40
−2	57	10	38
0	51	12	37
2	46	14	37
4	43	16	37
6	41		

NOTICES TO AIRMEN

Charges for Accommodation, etc., for Civil Aircraft at Government Civil Aerodromes, R.A.F. Aerodromes, and Seaplane Stations.

1. With reference to Article 7 (5) of the Air Navigation Order, 1922, the dues to be charged at Government Civil Aerodromes R.A.F. Aerodromes and Seaplane Stations are as follows :—

A. Accommodation.

The charge for accommodation will be based on the floor space occupied, *i.e.*, the product of span and overall length. With folder aircraft the span will be taken as the overall width when folded. Charges will be as follows :—

	8 hrs. or less. £ s. d.	Up to 24 hrs. £ s. d.
Class A.—Small type, less than 900 sq. ft.	0 2 6	0 5 0
Class B.—Medium type over 900 sq. ft., but not exceeding 1,800 sq. ft.	0 5 0	0 10 0
Class C.—Large type, over 1,800 sq. ft., but not exceeding 3,600 sq. ft.	1 0 0	1 0 0
Class D.—Large type, over 3,600 sq. ft.	1 10 0	1 10 0

Monthly Rates.—Accommodation for monthly periods will be at rates of £5, £10, £20 and £30 respectively for the above classses of aircraft. Any accommodation so reserved, but not made use of, will be available for hire to other aircraft. No refund will be made to the monthly lessee, unless he is prevented by the re-allocation of the reserved accommodation from obtaining accommodation, in which case such proportionate refund will be made as in the opinion of the Secretary of State appears reasonable.

Payment for accommodation at monthly rates must be made in advance. The hire of premises under special agreement may be arranged upon terms which will be decided by the Air Ministry.

The provision of accommodation at R.A.F. Aerodromes and Seaplane Stations will be subject to the exigencies of the Service.

B. *Landing Fees.*

These will be in respect of the cost of maintenance of the aerodromes, use of landing lights and beacons and supply of navigational information.

The charges will include ordinary attendance, *e.g.* guiding machines, starting propellers, re-fuelling, etc. (For pushing machines with stopped engines any considerable distance, charges will be made in accordance with 3(*a*) below.) At aerodromes where no attendance is available the charges will remain the same.

The charges for single landing will be :—

Class A.—Small type, 2*s.* 6*d.* Class B.—Medium type, 5*s.* Classes C and D.—Large type, 10*s.* Aircraft with more than two engines, 15*s.*

No extra landing fee will be charged in respect of test flights before departure.

2. The Air Ministry, its servants or agents, will not be liable for loss or damage by accident, fire, flood, tempest, explosion or other cause to aircraft, or to pilots, engineers or other personnel thereof, or to any passengers, goods or mails carried therein landing at or accommodated in any Government Civil Aerodrome, R.A.F. Aerodrome or Seaplane Station from whatever cause arising, even if such loss or damage arises through negligence of the Air Ministry's servants or agents.

3.—(*a*) Attendance on civil aircraft by personnel of the R.A.F. or of Government Civil Aerodromes, other than the ordinary attendance included in the landing fees, will be charged for on the basis of labour and time. Such personnel will be available to assist civil aircraft only to a limited extent, and at certain aerodromes to be specified by the Secretary of State.

(*b*) Stores, such as fuel, oil, tyres, etc., and any standard spares that may be available, will be supplied to civil aircraft by the R.A.F. wherever possible, to meet emergency demands, and when no other source of supply is available. Such supplies will be charged for at the current retail prices.

(*c*) Subject to Service exigencies, repairs may be carried out by personnel of the R.A.F. or of Government Civil aerodromes for civil aircraft in emergency when no other arrangements can be made. Repairs will be confined to such work as will enable the aircraft to proceed by air within a short period. No repair which will exceed a cost of £10, exclusive of the cost of stores and spares supplied, will be undertaken before an estimate has been made and submitted to the owner of the aircraft.

Repairs carried out by personnel of the R.A.F. or of Government Civil Aerodromes will be carried out to the satisfaction of the responsible inspecting officer, but no responsibility as to the airworthiness of the aircraft shall rest on the R.A.F. or on the Government Civil Aerodrome staff or on the Air Ministry.

(*d*) Where R.A.F. workshops are available but no R.A.F. personnel can be spared, arrangements will be made, subject

to Service exigencies, to permit the use of the workshops by civilian firms on appropriate terms.

(e) Subject to the exigencies of the Service, salvage of aircraft will be undertaken by the R.A.F. inside R.A.F. aerodromes, and as far as possible outside R.A.F. aerodromes. In both cases charges will be made according to the cost involved.

(f) Mechanical transport will be placed at the service of civil firms in emergencies and when circumstances permit. The rates to be charged will be those in force for the time being for the use of R.A.F. motor vehicles, on repayment. Such charges will include the driver, and no vehicle will be hired without an R.A.F. driver.

(g) Arrangements will be made for the use of telephone, telegraph and Post Office facilities at Government Civil Aerodromes, R.A.F. Aerodromes and Seaplane Stations by civil firms using the aerodromes.

4. Arrangements may be made for the use of aerodromes for purposes of tuition, exhibition or sporting contests. The charges to be made in such circumstances will be such as may be specially arranged between the Air Ministry and the person or firm using the aerodrome.

(No. 118 of 1922.)

Thames Estuary Searchlights

(1) *Searchlight Positions.*—Searchlights for anti-aircraft practice will be operated at different points along the Thames Estuary in accordance with the following schedule :—

(a) *Sheerness.*—35,000 c.p. searchlight, operated between the hours of dusk and midnight fortnightly as from Wednesday, October 25.

(b) *Gillingham Pier.*—35,000 c.p. searchlight, operated normally from 1900 to 2100 hours on Tuesdays and Fridays during the winter.

(c) *Gravesend.*—35,000 c.p. searchlight, operated normally from 1900 to 2100 hours on Mondays and Thursdays during the winter.

(d) *Area Sheerness, Gillingham, Gravesend.*—Two 25,000 c.p. searchlights, operated in this area from 1900 to 2100 hours on Mondays, Tuesdays, Thursdays and Fridays.

(2) *Warning.*—Pilots are warned not to mistake these searchlights for lights operated from aerodromes. The times given above are normal, but the lights may occasionally be operated at other times.

(3) *Previous Notices.*—See sketch map published with Notice to Airmen No. 51 of 1922.

(No. 119 of 1922.)

Napier "Lion" Engines : Engine Bearer Clearances

Several engines have recently been discovered in which the metal on the inside of the bearer feet has been filed away at the radius, in order to provide clearance for the engine bearers of the machine.

Such removal of metal is undesirable, but, if essential to effect necessary clearance, is not detrimental, provided the extent is small and care is taken to leave the maximum possible radius for the blending of the bearer foot into the crank-case wall.

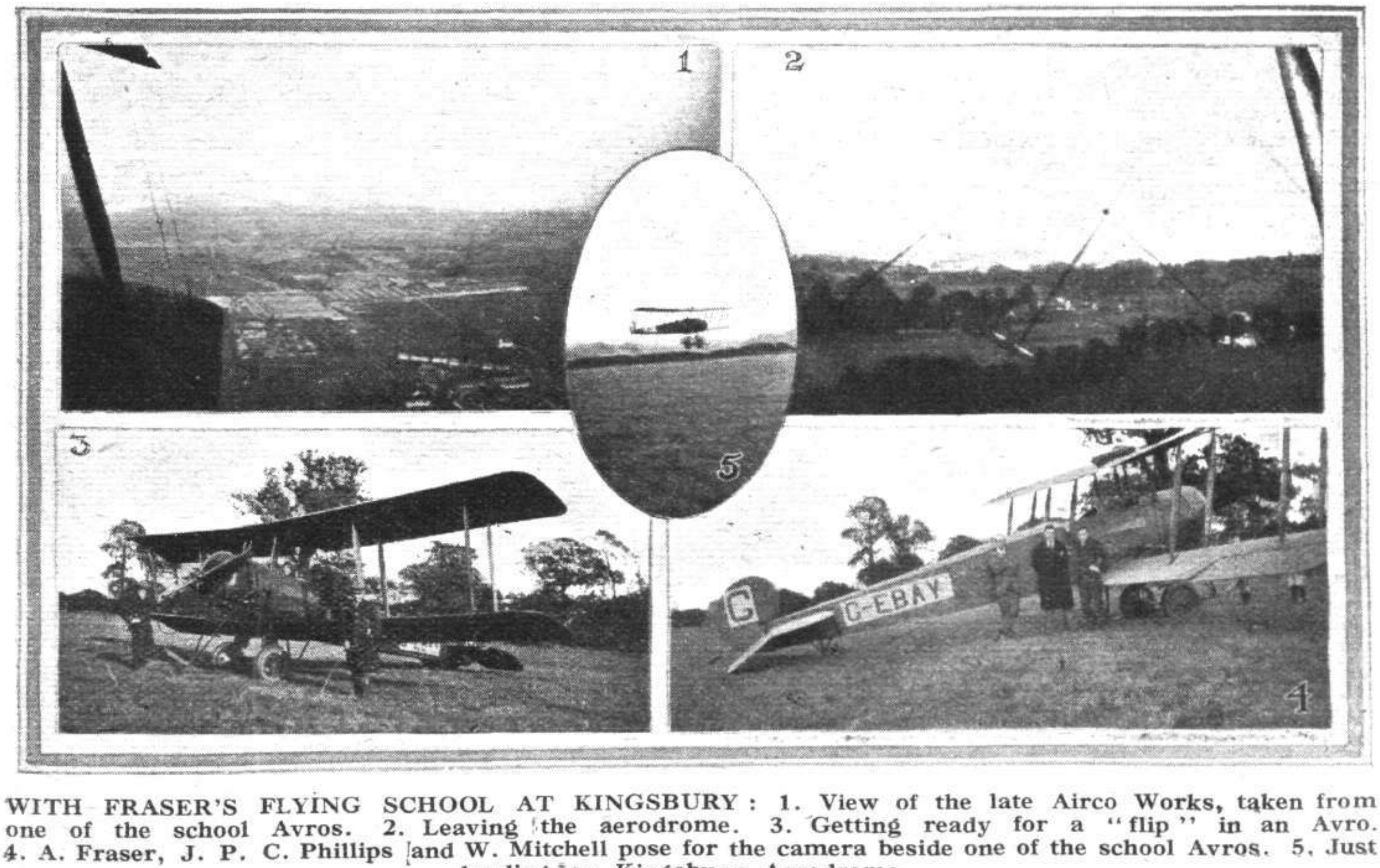
It is dangerous, however, merely to file the metal so as to leave a sharp radius, in that cracks will inevitably start at the corner.

(No. 10 of 1922.)

THE ATLANTIC CRUISE OF H.M. AIRSHIP "R. 34"

Under this title Mr. E. E. Turner, who was one of the engineers on board "R.34" on her historical cruise to America and back, read a paper before the Society of Engineers on November 6. Mr. Turner dealt briefly with the construction of the airship, and at considerable length with the design and installation of the five Sunbeam "Maori" engines which formed the power plant. As both the ship and her engines will be well known to readers of this journal, it is unnecessary to refer to this section of Mr. Turner's paper in detail, except to state that the fundamental principles of the design were very ably, although briefly, explained by the lecturer. The "three-wire" system of mooring, both on land and, to a degree, over the sea was explained and illustrated, and the general arrangement of the ship itself was also well illustrated by lantern slides from drawings, diagrams and photographs.

The latter part of the paper took the form of a very brief log of the outward and homeward voyages, and although in the very limited space available Mr. Turner could not, naturally, give such a complete picture of that adventurous journey as did the late Commodore Maitland in his book, he nevertheless succeeded in conveying to his audience an excellent sketch of life on board. The lecturer had nothing but praise for the Sunbeam engines, and it is of interest to quote from his log the passage dealing with the breakdown of the forward engine in the aft car. "This breakdown," the lecturer said, "was due in no way to the constructors, but the engineer, owing to a roll of the ship, slipped and fell against the clutch lever, disconnecting the engine from the propeller. The engine, being on full load, immediately raced up, and the resulting stresses caused the fracture. The governor gear had previously been disconnected."



WITH FRASER'S FLYING SCHOOL AT KINGSBURY : 1. View of the late Airco Works, taken from one of the school Avros. 2. Leaving the aerodrome. 3. Getting ready for a "flip" in an Avro. 4. A. Fraser, J. P. C. Phillips and W. Mitchell pose for the camera beside one of the school Avros. 5. Just landing on Kingsbury Aerodrome.

THE CASE FOR METAL CONSTRUCTION

By JOHN D. NORTH, F.R.Ae.S.

(Concluded from page 651.)

CORROSION

THE question "What about corrosion?" is such a common one that I may perhaps be excused if I introduce a little *résumé* of present-day opinions on corrosion generally. I hope to show that the susceptibilities of steel aeroplane parts to corrosion are due to faulty shop practice rather than any other cause, and to suggest that with proper precautions there is little to fear from oxidation. Further, the aeroplane which is virtually incorrodible is at last a practical proposition, and will make its appearance in the near future. A survey of the large volume of experimental data which has been accumulated on the subject of the corrosion of iron and steel leads us, at an early point in the enquiry, to the conclusion that the chemical reactions involved are by no means simple. Something more than a direct oxidation of iron atoms is involved. This is not in the least surprising. Of almost any apparently simple chemical reaction it can be said that the more closely we look into the mechanism of such change the more complex it grows.

It will not be disputed that the more that is known of the onset and course of development of a disease the greater hope there is, not only of effecting a cure, but of preventing a recrudescence.

Three theories which have been put forward to account for the corrosion of iron and steel will be noticed briefly :—

1. The acid theory.
2. The electro-chemical theory.
3. The recent colloid theory of Dr. Friend.

It may be said at once that no one of the above will suffice to explain all the well-established experimental facts.

1. **The Acid Theory.**—This requires the necessary presence of some acid in the water in contact with the metal before iron will rust at all. The carbonic acid present in water in all ordinary cases suffices. It is probably not a fact that iron will not rust in the absence of an acid. Be that as it may, in all cases that interest us the acid, carbonic, is inevitably present, and the presence of any acid, even so weak a one as carbonic, undoubtedly accelerates the corrosion of iron.

2. **The Electro-Chemical Theory,** in its broadest interpretation, includes the acid theory. This theory requires that, for corrosion, the iron shall be in contact with an electrolyte and oxygen. It is impossible and, for our purposes, unnecessary to say whether chemically pure water is an electrolyte; impossible because it is inconceivable that chemical methods have reached the ultimate in refinement, the chemically purest water yet prepared has a definitely measurable electrical conductivity and is an electrolyte in consequence; unnecessary, because the only water that interests us, that which condenses when the temperature falls below the dew point, that which falls as rain, is an undoubted electrolyte, and contains a measurable, though small, concentration of hydrogen and hydroxyl ions. The chemist associates what he calls acid properties with the presence, in large or small concentration, of the hydrogen ion. So water is an acid, a weak acid, perhaps the weakest known.

We have, in materials like iron and steel, which are neither pure nor homogeneous, a very fertile field for the establishment, in contact with an electrolyte, of local voltaic couples, and if the iron, as must sometimes occur, be anodic in such a couple, into solution it will tend to go as the iron ion, with a driving electromotive force behind it, which depends on the nature of the electrolyte in contact with it and on the nature of the cathode. Now this state of affairs, with iron the anode in a voltaic couple, will be found only in places on the surface of any given specimen. Corrosion due to this cause will then only develop at certain well-marked points of attack, accounting thus for the familiar phenomenon of pitting.

But this voltaic action, due to the heterogeneous character of the material and resulting in pitting, is not all. There has to be considered, in addition, the action between the metal itself and the electrolyte with which it is in contact. A metal in contact with a liquid ionises to some extent, with a definite electromotive force which can be measured tending to ionise it. In the absence of disturbing factors a state of equilibrium is set up when further ionisation ceases and a definite difference of potential between metal and solvent exists. This is the ionic theory of solutions universally accepted by physical chemists as giving the best expression yet to the whole of their knowledge of the mechanism of solution. The disturbing factor that matters to us is the presence of other ions in the liquid, hydrogen ions. The electro-chemical theory of corrosion then attributes the corrosion of the metal to two causes, operating together or singly.

(1) Local voltaic actions.
(2) Straightforward solution of the metal.

The non-corrodible steel will be of such a character that neither of these causes can operate.

Dealing with local voltaic actions first. The presence or absence of the conditions necessary for setting up such actions will depend upon :—

First and foremost, the presence of impurities or, what is equally harmful, local segregations. As an example, it has been established that in the presence of black scale the iron becomes anodic and consequently passes into solution.

(2) *The micro-structure* of the material and anything which has happened to the material in its life history which is known to affect the micro-structure—*e.g.*, heat treatment—is very important.

(3) *Chemical composition.*

(4) *The physical condition of the material,* due to heat treatment or mechanical working. Strained and unstrained portions of a homogeneous material constitute an active voltaic couple.

There is nothing here that proper care in the selection, manufacture and handling of the material cannot successfully deal with.

Straightforward Solution of the Metal.—Whether or not a metal goes into solution in a liquid, it has been said above, depends upon what potential difference exists in the particular case under investigation. All these quantities are susceptible of accurate measurement. Hadfield and Newberry, working on these lines, in acid solutions, have show that before solution of a given metal can take place the following condition must be satisfied :—

Electrode potential of the metal + the over-voltage must be greater than the hydrogen potential for the solvent.

The electrode potential or solution pressure is a matter of chemical composition; and it should not be impossible to produce an alloy to fulfil this condition, in which corrosion by straightforward solution would be impossible.

Of the two causes of corrosion, according to the electro-chemical theory, the localised formation of voltaic couples, resulting in pitting, appears to be responsible for most of the damage. Recent experiments carried out at the United States Bureau of Standards on the corrosion of high chromium steels by air and water have shown that the rusting of such steels was always local—a surface film of rust was not observed in any instance.

Having regard to both causes of the corrosion of steels, it is clear that a non-corrodible steel is not a mere figment of the imagination, and practical knowledge of the properties of 12-15 per cent. chromium steels and irons indicates the material has already arrived.

3. **The Colloid Theory.**—There remains to be noticed the recent colloidal theory of Dr. Friend. This theory claims that ferrous hydroxide in a colloidal form appears at an early stage in the course of corrosion; this is oxidised to ferric hydroxide, still in a colloidal form, as oxygen from the air gains access. And this colloidal ferric hydroxide catalytically accelerates the corrosion of further iron, undergoing alternate reduction by new metal and re-oxidation by fresh oxygen. In other words, the colloidal ferric hydroxide acts as a catalytic carrier of oxygen from air to metal, a type of catalytic action which is perhaps better understood of chemists than any other.

It would appear that this theory would serve to supplement rather than supplant the electro-chemical theory. The iron is brought into an attackable condition by electro-chemical forces, and the course it then follows to its ultimate destination, more or less hydrated ferric oxide, may very well be *via* the colloidal processes of Dr. Friend.

The above only indicates rather sketchily the manner in which the addition of a high percentage of chromium to ferrous metals has gone far to make an end of the corrosion trouble root and branch, but also furnishes the clue to the precautions to be taken with ordinary steels to fight corrosion. Firstly, see that the material is free from black scale. This is best accomplished by electrolytic cleansing. Before painting see that the steel is dry and chemically clean as possible.

Whatever flux is used for soldering in the shops chlorides will be found on all soldered fittings and many unsoldered

ones (resin is not a practical flux) and the parts must be properly cleaned, the wash waters being controlled by analysis. If this is carried out effectively and a suitable paint used there is little fear of corrosion where the protecting coating remains undamaged.

It is not only in the protection of steels against corrosion that advances are being made. Recent experiments have shown that the successful treatment of light alloys is practically an accomplished fact.

RELIABILITY.

Apart from this question of corrosion, it is necessary to consider in what other respects an all-metal aeroplane might be structurally unreliable. I think the following will cover the ground :—

(*a*) Material not up to specifications due either to faulty inspection or the failure of the inspection to reveal the quality of the bulk under examination.

(*b*) Subsequent mistreatment either by heat treatment or cold work.

(*c*) Undetected errors of workmanship.

(*d*) Damage to members in assembly, delivery or service.

(*e*) Failure of riveting under service conditions.

(*f*) Failure under alternating stress, *i.e.*, "fatigue."

So far as (*a*) is concerned, I think that there can hardly be any doubt that metal, particularly wrought metal, is at a great advantage compared with timber. The test samples represent materials of the same composition which have gone through the same processes in the mill and the same heat treatment. The production of carbon steel bars has reached such a high standard that this material *as used* is taken as the standard reliability material by the Load Factor Sub-Committee in the section of its report dealing with reliability. In the thin strip ingot, faults, such as segregation, slag inclusion, etc., are generally noticeable, and are in any case revealed in rolling or drawing together with most other material faults should they escape detection before testing. Timber is, however, only representative to the extent indicated by the theory of probability; while its inspection depends on deductions from experience concerning which there is not complete agreement among timber experts.

(*b*) Can be prevented by proper works organisation, and is practically confined to those metal parts common to both metal and composite aeroplanes.

(*c*) Are far more difficult to conceal than in wood, particularly as riveting replaces welding. Contrary to popular opinion, defective riveting in properly designed members has very little influence on their strength, within the extreme limits of error experience has shown as likely to occur.

(*d*) Is also not the weak point one might imagine from the thin materials used. The very qualities which enable the members to develop a high stress render them fairly immune from the effects of rough handling, but this point has to be considered in design. That glaring damage is not fatal to the structure has been shown by reloading members broken in test. The most serious danger is fatigue failure from the repeated application of a blow on a particular point; when, for example, a portion of the shell is repeatedly bumped, say, on the tailboard of a lorry, an alternating stress failure in the form of a crack may appear; it is, however, very obvious and easily repaired, while with similar bad packing a wood member might be irreparably injured.

So far as (*e*) is concerned, I have already mentioned that a certain amount of rivet failure does not seriously deteriorate the structure, and there is with steel at least no evidence of the failure of riveting nor any logical reason why it should fail. In properly designed members the rivets are merely shearing pins expanded to fill the rivet holes while the head prevent any possibility of falling out. The very remote possibility of an alternating shear stress, sufficient to cause a fatigue failure, can be guarded against in design. The rivets are in fact in much the same category as most of the bolts on an aeroplane with the difference that in the case of the rivets individual failure is of negligible importance.

On a larger scale there is extensive experience of riveting in all branches of engineering, and everything in this experience tends to show that riveting is a satisfactory joining process.

(*f*) Considerable strides have been made in the last few years in understanding alternating stress failures, particularly by a better comprehension of stress distribution. Under the auspices of the A.R.C. several notable papers on this subject have been published, a study of which would remove a great deal of misapprehension. An alternating stress failure may occur after a large number of cycles in which the stress has fluctuated over a range in excess of certain values which appear to be associated with the ultimate tensile rather than the elastic properties of the material. That stress fluctuations will take place in prime movers, vehicles and similar machines is obvious from a study of their mechanism, but in a structure such as an aeroplane they are mostly due to fluctuating loads from the engine direct, varying loads on aerofoil surfaces due to the irregular wake velocity of the slipstream or resonant vibrations originating from either of these. The streamline wire is a notable exception since it has an unstable yawing derivative N_r from which the well-known sound-producing oscillation of these wires is derived.

The only direct fluctuating loads from the motor which I have known to produce failure by fatigue are the rotating couples from fixed radial engines, where these have not been allowed for in design. The maximum amplitude of resonant vibrations is generally small and the mean stress fluctuation is small, too; but the difficulty arises in the complex distribution of stress during small deformations in other than simple members. Reference to the work of Taylor, Griffiths Coker and others, will show how complex this is and what a marked influence small but sharp changes of section have on it. Generally speaking, the avoidance of rapid changes of section (*e.g.*, sharp corners) in conjunction with material of adequate ductility, is sufficient insurance against high localised stress; metal construction falls in easily with this requirement. We can hardly go further into the subject, but it is safe to say that fatigue failures, if they occur, must be traced to the drawing office, not to the use of steel as a structural material.

METAL COVERING

The desirability or otherwise of metallic covering seems to me to be largely a matter of policy. I see in the *Journal* that Mr. O. Short puts the weight of metal covering at .2 lbs. per square foot presumably of covering. If this is the case metallic covering means an addition of 5 to 6 per cent. to the gross weight of the aeroplane—an addition which I should imagine could only be tolerated in very exceptional cases. I do not believe that it is imperative that aircraft should be *all metal*, quite a few parts—not structural—are probably better of wood except under special climatical conditions. Fabric covering, especially when it can be re-doped, really gives long service, and re-covering encourages general overhaul.

I believe that anyone who examines the possibilities of metal construction on the lines I have indicated will appreciate the possibilities of reducing the structure weight of aeroplanes by the use of metal construction, and where they are able to supplement their deductions by experience they will be convinced of the great future in front of it. The fact that metal aeroplanes will stand adverse climatical conditions, long storage and, I believe, the wear and tear of everyday use in temperate climates better than aeroplanes largely built of timber and joined with glue is further argument in its favour.

The development of technique will undoubtedly tend more and more to eliminate the necessity for skilled labour in course of construction, and this opinion is fortified by experience. It is probable also that load factors will be able to be lowered without increasing the risk of structural failure or alternatively increase of reliability may be obtained.

I have said nothing so far on the subject of fire risks, though some improvement may be attained in this direction. Those fires in the air, resulting in a large quantity of petrol burning in a comparatively confined space, would hardly be affected if the aeroplane were made of asbestos; but since fires after a crash, probably now more to be feared, are often caused by splinters of wood coming into contact with hot exhaust pipes, this latter class of fire risk should certainly be minimised.

On looking through these notes I cannot feel that I have presented the case for metal construction as completely and convincingly as it deserves to be presented. I have been so closely occupied during the last few years with the thousand and one details of this new development that I have found it somewhat difficult to put this subject before the Society in a general way. If I had once started entering into details I should hardly know where to stop, and details as they arise will be more interesting to those who are taking up this work for themselves.

In conclusion, I should like to thank those gentlemen who have assisted me in the preparation of this paper, particularly Dr. Leslie Aitchison, who has rendered invaluable help on metallurgical matters and who kindly supplied the curves illustrating the variations of "E"; also Mr. A. E. Odgers, M.A., for the *résumé* on corrosion, and several other members of my experimental staff. I have also to thank Messrs. Boulton and Paul, Ltd., for permitting me, for the purpose of this paper, to make use of information and experience gained in their aeronautical department.

AIRISMS FROM THE FOUR WINDS

PHEW! What a shock!

From the alert staff of our Press Cutting Agency, which sends us snippings upon matters aviatic, comes an article boldly headed "A Million in Flight," which, needless to say, intrigued us muchly until we realised that it was that number of wretched refugees from Asia Minor trying to find a safe foothold somewhere. But really, now that "flight" is an accomplished everyday fact, it is about time some substitute word should be evolved for shock headlines of this character. For the moment our mind wobbled between the sudden arrival of a million transatlantic flyers and visions of our receiving a bankers' draft for a round half-million on account as a small recompense for FLIGHT's missionary work in the past.

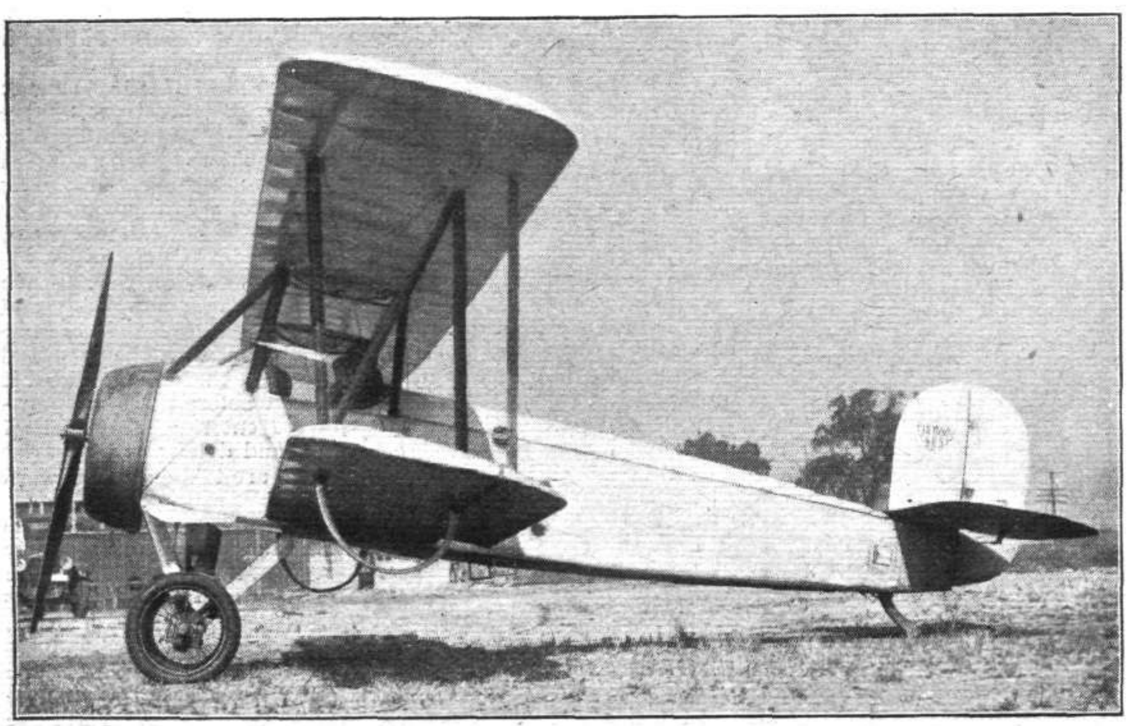
And then we awoke. But in these nervy days it won't do to strike a dud mine like that too often. Phew!

THUS Mr. Edmund Jordan in a letter to the Press :—

"'*Gliders' or 'Aeroscaphes.*'

"Victor Hugo, in his wonderful description of Gilliatt upon the rocks of the Douvres in 'The Toilers of the Sea,' commenting on continuous air currents and winds moving in zones, says :—'Aerial navigation by means of wind boats, to which the passion for Greek terminology has given the name of "aeroscaphes," may one day succeed in utilising the chief of these streams of wind. The regular course of air streams is an incontestable fact. There are both rivers of wind and rivulets of wind, although their branches are exactly the reverse of water currents. . . .' May I suggest that it is an anachronism to consider as novelties 'gliders,' or even aeroplanes, and that the aeroplane is a mechanically propelled aeroscaph?"

Vickers "Viking," Napier "Lion" engine, in Spain: Our photograph shows the machine at San Sebastian after alighting in the bay on its way to Madrid.



The Dayton-Wright "Chummy" Training Biplane: A two-seater side-by-side machine, fitted with a Le Rhone 80 h.p. engine. In September last a student of the Dayton-Wright Co., K. M. Lane, who had never previously touched the controls of a 'plane, started to take instruction on one of these machines early in the morning, and that evening made his first solo flight. His total instruction time was 4 hrs. 26 mins. His instructor was W. E. Lees.

THE ROYAL AIR FORCE

London Gazette, October 24, 1922

General Duties Branch.

Flying Offrs.—Lieut. G. V. Carey, Devonshire R.; Lieut. A. P. Davidson, Highland L.I.; Lieut. C. F. Ellicott, Dorset R.; Lieut. A. S. Godley, R. Scots; Lieut. J. P. Huffam, V.C., Duke of Wellington's R.; Lieut. G. C. Oldham, The Queen's R.; Lieut. E. C. Ridlington, R.G.A.; Lieut. D. Stansby, R.G.A.; Lieut. A. H. Stirling, R. Scots; Sec. Lieut. P. J. Chambers, Border R. The follg. Pilot Offrs. to be Flying Offrs. (Sept. 29):—H. A. C. Atkinson, J. N. Boothman, T. W. S. Brown, P. K. Campbell, D. M. N. Coles, A. B. Cree, E. S. Edwardes, B. E. Embry, A. Findiey, C. Gardner, H. E. Greenberry, D. R. Loch, A. Maybaum, E. C. Moon, G. J. Rayner, J. V. Roberts.

The follg. are transferred to Reserve (Oct. 24):—

Class A.—Flight Lieut.—D. A. Stewart, M.C., D.F.C., A.F.C.

Flying Offrs.—W. Bentley, D.F.C., E. A. J. Brown, S. L. Cannon, K. C. L. Gorringe, A. L. Jones, G. Kidd, A. J. H. Taylor, L. E. Vine, H. E. Winch.

Class B.—Squadron-Leader.—H. C. Fuller.

Flight-Lieuts.—J. C. Atkinson, J. L. L. Duffus, A. D. Newbury, H. G. P. Rees, A. Roberts, A. C. Snow, L. Whitworth, A.F.C., W. P. Woodcock.

Flying Offrs.—A. A. W. Barron, R. Ll. Cantle, T. W. Cave, M.C., G. F. Drudge, F. J. Magee, A. J. Packham, H. A. Smith, E. Taylor.

Observer Offrs.—P. J. Bradley, R. Hamilton, M.C., B. J. Paget.

Class C.—Flight Lieuts.—J. E. M. Atherley, L. H. Pakenham-Walsh, D.F.C.

Flying Offrs.—G. Baillie, V. W. Burgess, A. V. Gash, W. Halliwell, J. D. Jackson, L. J. Lipscomb, F. R. Steggall, D.C.M., A. W. S. Wagner.

Observer Offr.—P. A. Cockeram, M.C.

Flying Offr. L. S. Punnett is transferred to the Reserve, Class C; Oct. 12. Flying Offr. J. R. Starck is placed on the ret. list; Oct. 4. Flying Offr. P. Wilson, M.C., relinquishes his short service commn. on acct. of ill-health, and is granted the rank of Capt.; Oct. 25.

Stores Branch

Capt. and Asst. Paymr. W. B. Johnstone, R.A.P.C., is granted temp. commn. for Accountant duties as Flight-Lieut. on seconding for three years' duty with R.A.F., with effect from Oct. 1, and with seny. of April 1, 1918. Flight-Lieut. W. B. Johnstone to be actg. Squadron-Leader; Oct. 1.

Medical Branch

J. M. Maxwell is granted permanent commn. as Quartermaster and Flight-Lieut., with effect from, and seny. of, Oct. 1. Flight-Lieut. H. S. C. Starkey, O.B.E., M.D., is granted permanent commn. in rank stated; July 18, 1921 (since promoted) (*Gazette*, Aug. 2, 1921, appointing him to short service commn. is cancelled). Flight-Lieut. T. M. Walker is granted a short service commn., retaining present substantive rank and seny.; Oct. 25. Capt. B. F. Beatson, D.T.M., I.M.S., is granted temp. commn. as Flight-Lieut. whilst seconded for duty with R.A.F.; Oct. 13.

London Gazette, October 31, 1922

General Duties Branch

Sqdn. Ldr. A. W. C. V. Parr is granted a permanent commission as a Flt. Lt.; Sept. 7. He will be placed at the head of the gradation list of Flt. Lts., but will take seny. in accordance with his relative position with other officers similarly reduced in rank on the grant of permanent or short service commns. G. A. Hadley is granted a short service commn. as a Flying Offr., with effect from, and with seny. of, Oct. 23. Sec. Lt. L. W. Mercer, R.G.A., is granted a temp. commn. as a Flying Offr. on secdg. for four years' duty with the R.A.F.; Oct. 20. The following are transferred to Res. (Nov. 1):—Class A.—Flying Offr. N. W. Hustings. Class B.—Flt. Lt. R. L. Stephenson-Peach, M.B.E.

Flt. Lt. G. Barrett, A.F.C., is placed on the retd. list on account of ill-health contracted in the Service; Nov. 1.

Nursing Service

The following ladies are confirmed in their appts. as Staff Nurses (April 15):—Miss E. L. M. Graham, Miss E. Crozier, Miss M. J. Macdonald.

Memorandum

Sec. Lt. D. W. Giles relinquishes his temp. commn. on enlistment in the T.A.; May 8, 1920.

London Gazette, November 3, 1922

General Duties Branch

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., is placed on half-pay, Scale A; Aug. 1. Group Capt. F. V. Holt, C.M.G., D.S.O., ceases to be secd. for duty with the Chinese Government; Sept. 1. Flying Offr. I. G. G. Edgar is transfd. to Res., Class A; Sept. 26 (substituted for *Gazette*, Sept. 12).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Group Captain: P. F. M. Fellowes, D.S.O., from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 22.9.22. For duty as Officer Commanding R.A.F., Constantinople.

Squadron-Leaders: D. Blair, from Headquarters, Inland Area, to Headquarters, R.A.F., Iraq. 20.10.22. W. Sowrey, D.F.C., A.F.C., from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 1.11.22. F. N. Smartt, M.B., B.A., from R.A.F. Depot (Inland Area) to No. 1 Group Headquarters (Inland Area). 8.11.22. F. C. Jobson, from No. 7 Group Headquarters (Inland Area) to R.A.F. Depot (Inland Area). 19.10.22.

Flight-Lieutenants: E. P. Hardman, D.F.C., from No. 30 Squadron (Iraq) to No. 84 Squadron (Iraq), for duty as Adjutant. 18.5.22. E. E. Deans, D.S.C., from No. 2 Squadron (Detached Flight) (No. 12 Wing, Ireland) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 1.11.22. H. E. P. Wigglesworth, D.S.C., from Irish Flight (No. 12 Wing, Ireland) to No. 2 Squadron (Detached Flight) (No. 12 Wing, Ireland). 23.10.22. J. W. H. Steil, M.B., from Headquarters (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 14.10.22. J. S. Holloway, from No. 207 Squadron (Inland Area) to C. and M. Party, Bircham Newton (Inland Area). 25.9.22. W. R. S. Humphreys, A.F.C., from No. 207 Squadron (Inland Area) to C. and M. Party, Bircham Newton (Inland Area) (Supernumerary). 25.9.22. W. R. S. Humphreys, A.F.C., from C. and M. Party, Bircham Newton (Inland Area) to No. 100 Squadron (Supernumerary). 16.10.22. T. C. Luke, M.C., from R.A.F. Depot (Inland Area) to No. 56 Squadron (Inland Area), for duty as Adjutant. 1.11.22. C. McM. Laing, M.C., A.F.C., from No. 25 Squadron (Inland Area) to C. and M. Party, Hawkinge (Inland Area). 25.9.22. C. McM. Laing, M.C., A.F.C., from C. and M. Party, Hawkinge (Inland Area) to No. 56 Squadron (Inland Area). 1.11.22. L. A. K. Butt, from No. 4 Flying Training School (Middle East) to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. J. P. Coleman, A.F.C., from Aircraft Depot, Egypt (Middle East) to No. 56 Squadron (Detached Flight) (Constantinople Wing). 26.9.22. M. Moore, from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 26.9.22. R. P. M. Whitham, M.C., from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 22.9.22. P. J. Murphy, from Stores Depot, Egypt (Middle East), to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. M. J. James, M.B.E., from Egyptian Group Headquarters (Middle East) to Headquarters, Constantinople Wing (Supernumerary). 26.9.22. C. T. O'Neill, M.B., from No. 216 Squadron (Middle East) to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. T. F. N. Gerrard, D.S.C., from Central Flying School (Inland Area) to No. 5 Flying Training School (Inland Area). 21.10.22. H. H. Balfour, M.C., from Central Flying School (Inland Area) to No. 10 Group Headquarters (Coastal Area). 1.11.22. C. A. E. I. Brownlee, M.B., from Air Pilotage School (Cadre) (Inland Area) to No. 2 Squadron (Inland Area). 28.10.22. F. E. Johnson, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Central Hospital (Coastal Area). 23.10.22. R. G. J. McCullagh, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Air Pilotage School (Cadre) (Inland Area). 23.10.22. J. M. Maxwell (Quartermaster Med.), from Army (R.A.M.C.) to Baghdad Combined Hospital (Iraq) on appointment to Permanent Commission as Quartermaster and Flight-Lieutenant (Medical) on transfer from Army; for duty as Quartermaster. 1.10.22. C. E. W. Foster, from No. 5 Flying Training School (Inland Area) to R.A.F. Depot (Inland Area) (Supernumerary). 27.10.22. H. A. Smith, M.C., from School of Naval Co-operation and Aerial Navigation (No. 230 Squadron) (Coastal Area) to No. 39 Squadron (Inland Area). 27.10.22. H. A. Whistler, D.S.O., D.F.C., from No. 2 Flying Training School (Inland Area) to R.A.F. Cadet College (Flying Wing) (Cranwell). 27.10.22. K. B. Lloyd, A.F.C., from No. 2 Flying Training School (Inland Area) to Central Flying School (Inland Area). 27.10.22. J. J. Breen, from M.T. Repair Depot (Inland Area) to Air Ministry (Dept. of A.M.P.) (D.D.O.). 8.11.22. W. Hodgson, O.B.E., from Air Ministry (Dept. of A.M.P.) (D.D.O.) to M.T. Repair Depot (Inland Area). 8.11.22. For duty as adjutant. T. Fawdry, M.B.E., from R.A.F. Depot (Inland Area) to Armament and Gunnery School (Inland Area). 1.11.22. H. E. Flavelle, from R.A.F. Base, Leuchars (Coastal Area), to Electrical and Wireless School (Inland Area). 31.10.22.

Col. Cuthbert Evans, C.B., C.M.G., D.S.O., to command Headquarters, Palestine, on appointment as G.S.O. 1; on attachment to Royal Air Force until 26.6.24. 15.5.22.

Brevet-Lieut.-Col. William Elliott, C.B.E., D.S.O. (R.A.S.C.), to command Headquarters, Palestine; on appointment as Deputy Asst. Director of Supplies and Transport; on attachment to the Royal Air Force for two years. 1.9.22.

Capt. A. H. Cope, D.S.O. (Devon R.), to command Headquarters, Palestine; on appointment as G.S.O. 3; on attachment to the Royal Air Force until 1.4.25. 15.5.22.

A "Roland Garros" Squadron

FROM Paris it is reported that a number of famous French "Aces" have formed a society to be known as "L'escadrille Roland Garros," and which is to take part in all important aviation meetings and also give exhibition flights. The "Escadrille" is chiefly intended to do propaganda work, and its president is M. Léon Bathiat. The idea originated with M. J. C. Bernard, who will take over the post of Secretary. M. Laurent Eynac, French Under-Secretary of State for Air, has received a deputation consisting of Sadi Lecointe, J. C. Bernard and Haeglen, and has officially sanctioned the formation of the squadron, promising at the same time a Government subsidy towards its expenses. Already the following French pilots have joined the Squadron: Sadi Lecointe, J. C. Bernard, Jean Casale, Haeglen, Fronval and Dominicis. Three Italian aviators, Scaroni, Ferrarin and Brach Papa, have joined, and Belgium is represented on the squadron by the Chevalier Willy Coppens. At the moment we do not know of any British "Ace" who has joined. The Squadron will be officially recognised, and M. Laurent Eynac will make full use of its services for propaganda purposes.

Aviation in Russia

RUMOUR is again busy with great aviation projects in Russia. It has been stated that a great fleet of 5,000 aeroplanes is being constructed in Russia by German designers and engineers, and that this fleet is to be used to establish aerial communications throughout Russian territory. At first it is intended to use German personnel both on the constructional and operational sides, but by degrees it is hoped to train a sufficient number of Russians to take over the entire running of the services. In the meantime, the opening thus provided for German engineers and financiers is thought to be excellent, and, to put it quite bluntly, to provide, at Russian expense, the training and experience which Allied restrictions prevent them from getting at home. The situation is not, however, without its dangers, and should be closely watched from this side. A fleet of 5,000 "red" Russian aeroplanes, even if ostensibly "commercial," is not pleasant to contemplate.

PERSONALS

Married

Flying Officer BERNARD LESLIE BLOFELD, R.A.F., third surviving son of Mr. and Mrs. H. Blofeld, of the Woodlands, Sydenham Hill, was married on November 1 at Holy Trinity Church, Richmond, Surrey, to DOROTHY EVELYN FIRMIN, widow of J. E. R. Firmin, Second Lieut., Wilts. Regt., and elder daughter of Mr. and Mrs. Arthur G. Chifferiel, of Inverleith, Denbigh Gardens, Richmond Hill.

WILLIAM WELLINGTON HALL, O.B.E. (late Major, R.A.F), youngest son of the late Henry Clifford Hall, of Reading, was married on November 1, at the Parish Church, Pangbourne, Berks., to ZOË MAUD LUKE, only daughter of the late Col. E. V. Luke, C.B., R.M.L.I., and Mrs. Luke, of Pangbourne.

Flight-Lieut. IAN M. MATHESON, R.A.F., of Pollo, Ross-shire, was married on October 31 very quietly at Eastchurch, Kent, to EILEEN MAY, only daughter of the late GEORGE GAMBLE of Winchester.

Killed

Flying Officer FRANK S. HARRICKS, R.A.F., who was killed in action on October 24, at Rania, Iraq, was the son of A. S. and L. Harricks, Eden Glen, Pavilion Road, Bournemouth.

THE "I.C.S." AND AVIATION

ALREADY before the War the International Correspondence Schools, of International Buildings, Kingsway, W.C. 2, included among the many subjects taught by post that of aviation. Among those early I.C.S. students was, it may be recalled, the late Mr. Robert Slack, who flew a Blériot, and later Morane, monoplane in 1911, 1912 and 1913. Mr. Slack won a prize presented by the I.C.S., if we remember rightly, and his great practical knowledge of his machine and engine proved that the I.C.S. course was sound and practical.

Then came the War, and for some years the aviation course was dropped, owing chiefly to the difficulty of keeping up to date in aviation matters. The course has now been entirely re-written, and has furthermore been extended very considerably. Not only so, but by subdividing the course into several branches, it has been possible to reduce the price for any one section, while those wishing to cover the entire ground can do so by taking the "Complete Aeronautical Engineering" Course.

The "Aeroplane Designer's" Course has been arranged to give instruction in such subjects as come within the scope of draughtsmen and designers in an aircraft office, dealing with aerodynamical as well as structural calculations.

Another course, "Special Pilot's," has been drawn up from information supplied by the Air Ministry to assist intending candidates for examinations for a Class A or Class B pilot's licence. It deals thoroughly with, in addition to the ordinary introductory papers on arithmetic, etc., with engines and aeroplanes, as well as with navigation, meteorology, etc.

The "Complete Aero Fitter's and Rigger's" Course includes both aeroplanes and engines, while the "Aeroplane Fitter's and Rigger's" course deals with machines only, and does not include papers on engines. The "Aero Engine Fitter's and Rigger's" Course deals entirely with engines, and does not touch work in connection with the machine.

Finally the International Correspondence Schools' aviation section includes five different "Ground Engineer's" special courses, drawn up to help those wishing to enter for Air Ministry examinations for ground engineers in Categories A, B, C, D and E.

Altogether the I.C.S. courses appear to include every phase except actual flying, and we would advise those interested to write to International Correspondence Schools, Ltd., International Buildings, Kingsway, W.C. 2.

Royal Air Force Sports Board

Arrangements for November, 1922

Saturday, November 11.—Fencing (R.A.F. *v.* Cambridge University), Cambridge.

Wednesday, November 15.—Rugby (R.A.F. (Cadet) College *v.* R.M.C.), Cranwell.

Saturday, November 18.—Rugby (1st round of Cup Competition to be completed), Cranwell.

Wednesday, November 22.—Fencing (R.A.F. *v.* Royal Navy), Uxbridge.

Wednesday, November 22.—Association (2nd round of Cup Competition to be completed), Uxbridge.

Saturday, November 25.—Rugby (An Air Force XV *v.* R.A.F. (Cadet) College), Cranwell.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

THE postponed competition for Mr. D. H. Pilcher's Challenge Cup will be held on Hackney Marshes on Sunday, November 19, at 12 noon. For full particulars see FLIGHT, September 28.

On Sunday, November 26, a Gliding Competition has been arranged on Wimbledon Common. For full particulars see FLIGHT, October 5.

On Saturday last at Sudbury, Messrs. Evans, Green, Johnson, Rippon and Rasmussen put in some good experimental work with their gliders.

On Sunday last members turned up in large numbers at Parliament Hill and gave an excellent display of model aeroplane flying and model gliding, to the delight of all present. Messrs. Pathé Frères' camera-men were also present and took a film. Some excellent new models were flown and made splendid flights.

Last Friday, at Headquarters, many of the members who visited Itford gave their views on the full-sized Gliding Competition, and an interesting discussion followed.

Our many members conveyed a practical and sincere congratulation to Mr. A. E. Jones by presenting him with a silver dish as a wedding gift. Mr. W. E. Evans, in making the presentation, dwelt on the sustained energy and resource shown by Mr. Jones on behalf of the Society, and his remarks were keenly endorsed by all members. Mr. A. E. Jones thanked the members for the good wishes, and said the token presented to him would be a constant reminder of many friends. In joining Mrs. A. E. Jones with his own appreciation, he assured the members their gift would be one of their most valued possessions.

On Friday next, at Headquarters, 20, Great Windmill Street, Piccadilly Circus, at 7.30 p.m., Mr. D. A. Pavely will open a discussion on the subject of "Wing Sections." All interested are invited to attend.

A. B. CLARK,
Technical Secretary.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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Published November 6, 1922

13,339. LUFTSCHIFFBAU ZEPPELIN GES, and P. JARAY. Airship gondolas. (187,262.)
19,174. A. A. HOLLE and COMMERCIAL AEROPLANE WING SYND., LTD. Aerofoils. (187,318.)
22,725. F. J. COUGHLIN. Parachutes. (187,395.)
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APPLIED FOR IN 1922
Published November 6, 1922

15,855. R. MEYER. Rotary engines. (181,366.)

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